Environmentally Sound Ships, Logistics, and Operations for the 21st Century

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Three Prong Approach

- Environmentally Sound Ships
- Supported by Environmentally Sound Logistics
- Integrated into Environmentally Sound Operations

IMO & MARPOL 73/78

- International Maritime Organization (IMO) Is Forum for International Agreements Affecting Maritime Industry (Individual Nations Then Ratify as National Law)
- Pollution Control = International Convention for the Prevention of Pollution by Ships (MARPOL 73/78)
  - Annex I: Oil Pollution
  - Annex IV: Sewage
  - Annex V: Solid & Plastics Waste
  - Annex VI: Air Pollution

- MARPOL Actually Excludes Public Vessels, But Many Nations Expect Their Naval Vessels to Comply

National Legislation

- Marine Mammal Protection Act
- Endangered Species Act
- Marine Sanctuaries Protection Act
- National Environmental Policy Act (NEPA)
- Clean Water Act (CWA)
- Clean Air Act (CAA)
- Oil Pollution Act 1990 (OPA 90)
- Act to Prevent Pollution from Ships (APPS)
- Uniform National Discharge Standards (UNDS)

What Do We Mean by Environmentally Sound Ships?

- Fully Mission Capable
  - Able to Reach Out and Touch Someone
- Able to Go Anywhere, Anytime
  - Access to All Ports
- Reduced Energy Consumption
- Reduced Cost of Waste Offload
- Reduced Manning

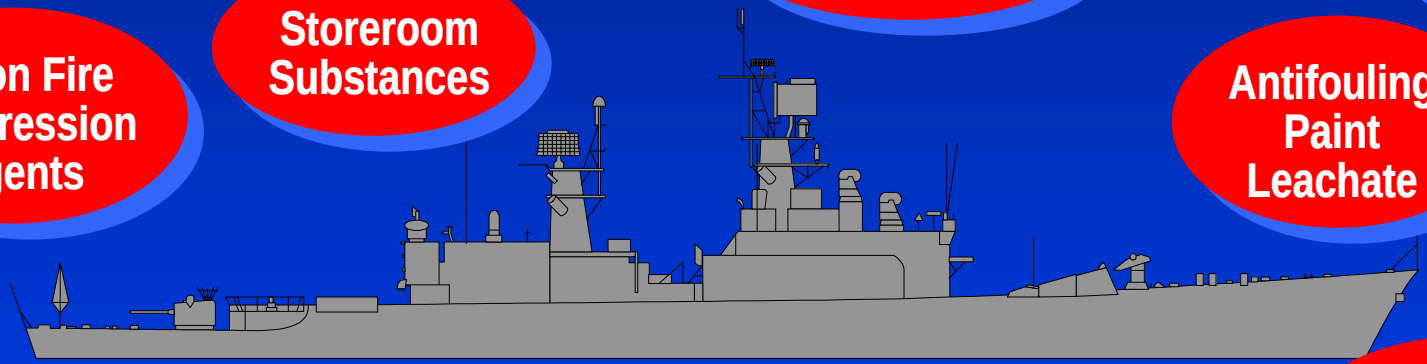
Why Do We Need Environmentally Sound Ships?

- Operational Freedom
- Access to Training Areas
- Access to Ports
- Reduce Life Cycle Costs
- Reduce Manning

How Do We Achieve Environmentally Sound Ships?

- Science and Technology Investment
  - Treat or Destroy Wastes on Board
    - Develop Dual-Use Technologies
  - Reduce Amount of Wastes Generated on Board
  - Minimize Impact on Marine Mammals and Endangered Species
- Environmental Planning

Typical Ship "Pollution" Sources



Plastics

Trash & Garbage

Reconnaissance Photographic Chemicals

Industrial Workshop Waste

Stack Emissions

CFC Refrigerants

Refueling Operations

Storeroom Substances

Halon Fire Suppression Agents

Antifouling Paint Leachate

Bilge

Commissary & Galley Drains

Ballast & Fuel Tanks

Human Wastes, Lavatory, and Shower Drains

Sick Bay Drains

Bilge Cleaning

Laundry Drains

Environmentally Sound Ship of the 21st Century

Processed Plastics

Processed Trash & Garbage

No Photographic Chemicals

Treated Industrial Workshop Waste

Low NOx Stack Emissions

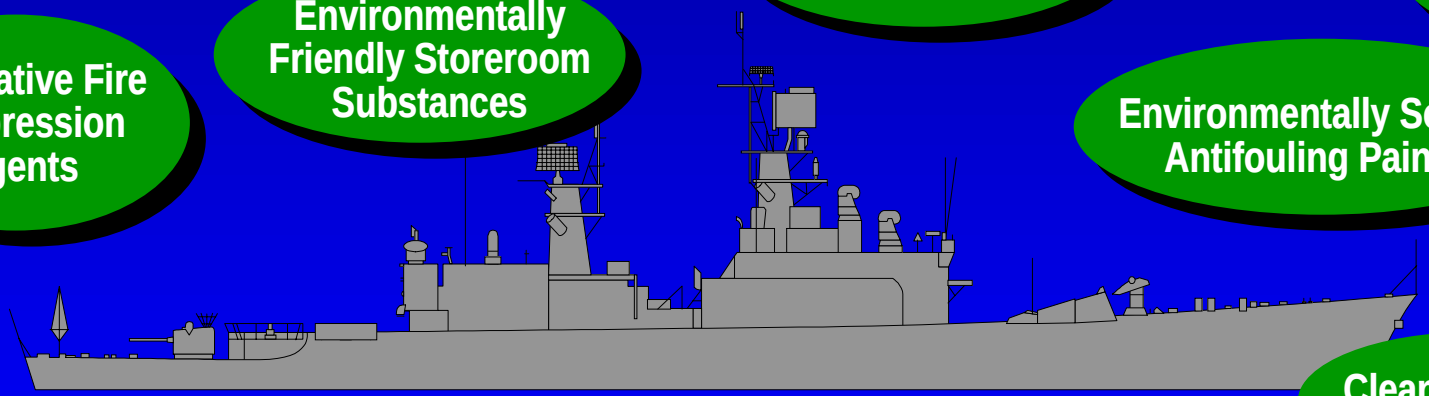
Ozone-Friendly Refrigerants

Env. Sound Refueling Operations

Environmentally Friendly Storeroom Substances

Alternative Fire Suppression Agents

Environmentally Sound Antifouling Paints



Clean Ballast & Fuel Tanks

Treated Bilge

Clean Commissary & Galley Drains

Treated Human Wastes, Lavatory, and Shower Drains

Clean Laundry Drains

Treated Sick Bay Drains

Non-Emulsifying Bilge Cleaning

NATO Strategy for ESS-21

Current Wastes/ Emissions	Outlook for Treatment/Elimination *Year 2000*	*Beyond 2000*
CFCs	New Refrigerants & Solvents	Alternative Cooling Technologies
Halons	Some Continued Essential Use	Alternative Fire Suppressants
Air Emissions	Little or No Change	Air Emissions Control
Oily Wastes	OWS w/ OCMs	OWS/OCM w/ Effluent Polishing
Sewage	Hold Where Required	Vacuum Collection → Destroy on Board
Graywater	Hold Where Required	Concentrate → Destroy on Board
Trash	Shred to Sink or Hold	Destroy on Board
Garbage	Hold or Pulp Before Discharge	Destroy on Board
Plastics Waste	Compact, Sterilize, & Hold	Destroy on Board
Hazardous Materials	Hold	Destroy on Board
Antifoulants	Environmentally Sound Paints	Natural Antifoulants

On Board Treatment Requires Technology

- **Blackwater and Graywater - Perhaps Our Greatest Challenge**
  - **Biological Conditioning**
  - **Membrane Filtration**
  - **Thermal Destruction**
- **Oily Waste**
  - **Membrane Ultrafiltration**
  - **Thermal Destruction**
- **Solid Waste**
  - **Pulpers, Shredders, and Plastic Waste Processors**
  - **Thermal Destruction**

Ship to Shore Interface and ESS-21

- **Shore Support will be Essential**
  - **Hotel Services**
  - **Maintenance**
  - **Corrosion Control**
  - **Waste Reception**

Environmentally Sound Logistics

- Effective
- Efficient
- Environmentally Friendly

What Do We Mean by Environmentally Sound Logistics?

- Smart Business Practices
- Minimal Packaging
- Just in Time Delivery
  - Spill Prevention Incorporated into Delivery Systems
- Minimal Storage / Transshipment / Handling
- Improved Personnel Safety and Health through Pollution Prevention

Why Do We Need Environmentally Sound Logistics?

- Save Money
- Ensure the Correct Material is Delivered Where Needed and When Required at the Lowest Cost
- Protect Our People

Source Reduction Efforts Underway Today

- Eliminate Excess Packaging
- Reduce Excess Hazmat through Centralized Control and Management
  - CHRIMP, HICS, HAZMIN Centers
- Pollution Prevention Technologies
  - P2 Afloat Program
    - Alternative Materials and Processes
- Reduce Maintenance on Board

Environmentally Sound Operations - ESO-21

- Supports Full Mission Readiness
- Integrates Environmental Considerations into all Aspects of Operations
  - Planning
  - Mission Accomplishment
  - Logistic Support
  - Post Mission Analysis
    - Feedback/Lessons Learned

What Do We Mean by Environmentally Sound Operations?

- Environmental Planning Integrated into Operational Planning
- Potential Impacts on the Environment Considered
- Appropriate Mitigation Measures
- Mission Accomplishment is the Priority

Why Do We Need Environmentally Sound Operations?

- Maintain Readiness
- Maintain Access
- Enhance Mission Accomplishment
- Reduce Costs
  - Waste Disposal
  - Remediation
  - Liability
- Maintain Public Support

Why International Cooperation?

- Leverage Investment
- Access to World Technology
- Save Time and Money
- Shape Future Regulations
- Interoperability and Standardization

Who are the Players?

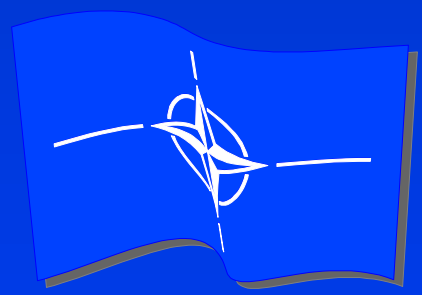
- NATO SWG/12 and NG/6
  - 11 NATO and 5 PfP Navies
- Umbrella MOU for Environmentally Sound Ships
  - France, Netherlands, United Kingdom, U.S.
- Trilateral Arctic Military Environmental Cooperation Program
  - Norway, Russia, U.S.
- Other Bilateral Relationships
  - Australia, Japan, Sweden

What is the Consensus?

- Environmental Regulations ARE Constraining Operations
- Environmental Requirements ARE Key Factors in Port Visit Decisions
- Waste Offload Costs ARE Major Cost Drivers
- Navies ARE Unique
- Commercial Technology is NOT Easily Integrated into Warships

Opportunities for Standardization

- Navy Doctrine (NWP 4-11)
- Joint Doctrine Revisions to Include Environmental Considerations
- NATO Standardization Agreement (STANAG)
- Environmental Annex (L) to Operation Plans and Orders
- Environmental Planning
  - Oil Spill Contingency Plans
- Exercises



Environmental Annex (L) to OPORDs and OPLANs

- Operational Environmental Guidance to Commanders
- Standard, Comprehensive Format
- Addresses all Phases of Operation
  - Preparation and Initial Deployment
  - Operations
  - Exit/Redeployment
- Specifies Environmental Reports

Affordable Environmental Systems as Force Multipliers

- Reduced Life Cycle Cost Saves Operating Funds
- Readiness Linked to Training Area Access
- Energy Efficiency Means More Bang for the Buck
- Ability to Process Waste On Board Enhances Endurance

The Way Ahead!

- Cooperative Environmentally Sound Ships Feasibility Study with UK
- Developing Aerated Membrane Wastewater Treatment System with Canada
- Exchanging Information on Membrane Oil Water Separators and Membrane Bioreactors with the Netherlands, Germany, and Norway
- Continuing Robust National R&D Program
- Developing NATO STANAG

Conclusion

- **Environmentally Sound Ships, Logistics, and Operations are the Vision of the Future**
  - **Mission Effectiveness - Through Design, Planning and Risk Mitigation**
  - **Readiness - Through Access to Training/Support Areas**
  - **Affordability - Through Smart Business Practices**
  - **Safety and Health and Environmental Protection - Through Training and Materiel**